Airborne LAN

More TTNT data-transmission nodes planned in time for major 2005 exercise

ROBERT WALL/WASHINGTON

Fighters, other air assets and ground systems should be able to exchange large amounts of data using an emerging Defense Advanced Research Projects Agency-developed battlefield local area network.

The baseline capability of the Tactical Targeting Networking Technology (TTNT) was shown earlier this year during the Joint Expeditionary Force Experiment (JEFX) 2004 exercise. Now Darpa is taking the next step: It wants to expand the four-terminal capability in time for next year's exercise, at which point TTNT should encompass a much larger architecture of up to 20 nodes.

Also in the works is an expansion of the frequency certification granted by the Commerce Dept.'s National Telecommunications and Information Administration. The research effort so far has achieved so-called Stage 2 certification, which is required for testing. Now developers are seeking Stage 4 approval, which is needed for an operational system. The certification process was begun early to reduce the time it will take to field TTNT, says USAF Maj. Steve Waller, Darpa's program manager. TTNT will be able to operate in three frequency bands to ensure the network can be established in any region of the world.

During the recent demonstration, TTNT was installed in a T-39 as a surrogate fighter, a mobile van and a combined air operations center, as well as on the Air Force's Paul Revere 707-based command-and-control testbed. By next year, the constellation will likely include as many as eight airborne systems and three or four ground-based ones. By plugging in "virtual users," the team will attempt to simulate a 200-user network. Darpa is working with Rockwell Collins on the project.

ESSENTIALLY, TTNT would provide the link between aircraft and the Pentagon's high-bandwidth global information grid. An Internet Protocol architecture is one of its key features. Large surveillance aircraft such as the U.S. Air Force's future E-10A would serve as routers in the sky because they have the space and power to accommodate the necessary equipment. That router would support fighters, unmanned aircraft and helicopters communicating on a local area network. In 2006, the network will likely be expanded to allied aircraft.

During the demonstration, developers were able to meet the target 2-Mbps. transmission rate at a range of 100 mi. The rate drops to 500 Kbps. at 200 mi. and 250 Kbps. at 300 mi. Modifications are being considered to boost throughput another 25-35%.

TTNT's increased bandwidth would offer clear advantages, notes Waller. It can take 20-40 sec. to transmit a still image via the Link-16 network. During JEFX, TTNT could pass eight images per second, although of slightly lower resolution, he notes. The network allowed controllers on the ground and on Paul Revere to steer imaging sensors carried on the T-39, validating the ability to control UAVs sensors from an aircraft.

TTNT also will expand chat-room messaging, a communications and coordination tool that's gaining prominence in the military. During the exercise, special ops personnel sent text messages to the air ops center requesting assistance. The T-39 crew saw the message and responded immediately, reducing engagement timelines, Waller points out.

Developers hope to integrate TTNT's capability in the new class of emerging software programmable radios. The Joint Tactical Radio System (JTRS) family is seen as a likely candidate. First fielding is envisioned for 2007 or 2008, although that's driven primarily by JTRS's schedule.

Establishing a tactical network should also become easier. Operators have long complained it is too cumbersome to "plug into" Link-16. For TTNT, the process should take no more than 5 sec., including passing the cryptological security barriers.

Ancillary roles are emerging for TTNT, such as using the network to assist in autonomous refueling of unmanned combat aircraft. Similarly, TTNT could find a role in aiding the recovery of UCAVs or manned aircraft on aircraft carriers.

Spy Blimp

Unmanned airship designs examined for long-endurance surveillance missions

DAVID A. FULGHUM/ANNAPOLIS, MD.

The blimp offers tempting advantages for intelligence-gathering by virtue of its persistence over the battlefield and ability to carry large payloads.

Moreover, advocates of the technology say that if properly managed, an airship also can provide some degree of stealth through reduced sound, sight, infrared signature and reflectivity that might attract enemy antiaircraft fire.

To take advantage of these possibilities, specialists in the arcane "black arts" of electronic warfare, signals intelligence-gathering and electro-optical and infrared sensor development are now looking anew at the use of airships. However, to the basic blimp are being grafted a number of technological twists.

Since an airship can stay aloft for days, Arinc Inc., based in Annapolis, is designing an unmanned version of the American Blimp Corp.'s A-170 airship, which recently performed a 24-hr. demonstration flight over Washington.

The unmanned blimp is being proposed as an ideal platform for urban warfare like that the U.S. is facing in Iraq, says Arinc's CEO John M. Belcher. The company is also looking at the stretched A-180 and other airships with greater lift